

Space Launch System Complex Decision-Making Process

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The Space Shuttle program has ended and elements of the Constellation Program have either been cancelled or transitioned to new NASA exploration endeavors. The National Aeronautics and Space Administration (NASA) has worked diligently to select an optimum configuration for the Space Launch System (SLS), a heavy lift vehicle that will provide the foundation for future beyond low earth orbit (LEO) large-scale missions for the next several decades. From Fall 2010 until Spring 2011, an SLS decision-making framework was formulated, tested, fully documented, and applied to multiple SLS vehicle concepts at NASA from previous exploration architecture studies. This was a multistep process that involved performing figure of merit (FOM)-based assessments, creating Pass/Fail gates based on draft threshold requirements, performing a margin-based assessment with supporting statistical analyses, and performing sensitivity analysis on each. This paper focuses on the various steps and methods of this process (rather than specific data) that allowed for competing concepts to be compared across a variety of launch vehicle metrics in support of the successful completion of the SLS Mission Concept Review (MCR) milestone.